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Addendum

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Supplement 23 to UN Regulation No. 54 (Tyres for commercial vehicles and their trailers)

Uniform provisions concerning the approval of pneumatic tyres for commercial vehicles and their trailers

Contents

		Page
1.	Scope	3
2.	Definitions	3
3.	Markings	7
4.	Application for approval	9
5.	Approval	10
6.	Specifications	11
7.	Modification and extension of approval of a tyre type	14
8.	Conformity of production	15
9.	Penalties for non-conformity of production	15
10.	Production definitively discontinued	15
11.	Names and addresses of Technical Services responsible for conducting approval tests, and of Type Approval Authorities	16
Annexes		
1	Communication	18
2	Arrangement of approval mark	20
3	Arrangement of tyre markings	21
4	List of symbols of load-capacity indices	23
5	Tyre-size designation and dimensions	24
	Part I - European tyres	24
	Part II - United States tyres	29
6	Method of measuring pneumatic tyres	36
7	Procedure for load/speed endurance tests	37
	Appendix 1 - Endurance-test programme	39
	Appendix 2 - Relation between the pressure index and the units of pressure	40
8	Variation of load capacity with speed commercial vehicles tyres - Radial and diagonal	41
9	Communication - Upgrade of service description for the purposes of retreading in accordance with Regulation No. 109	43

1. Scope

This Regulation covers new pneumatic tyres* designed primarily for vehicles of categories M_2, M_3, N, O_3 and O_4[1,2]. However, it does not apply to tyre types identified by speed category symbols corresponding to speeds below eighty (80) km/h.

2. Definitions

For the purposes of this Regulation:

2.1. "*Type of tyre*" means tyres which do not differ in such essential characteristics as:

(a) The manufacturer's name;

(b) Tyre-size designation;

(c) Category of use (normal tyre, snow tyre, special use tyre);

(d) Structure (diagonal (bias-ply, radial);

(e) Speed category symbol;

(f) Load-capacity indexes;

(g) Tyre cross-section.

2.2. "*Manufacturer*" means the person or body who is responsible to the Type Approval Authority (TAA) for all aspects of the type-approval and for ensuring the conformity of production."

2.3. "*Brand name trademark*" means the identification of the brand or trademark as defined by the tyre manufacturer and marked on the sidewall(s) of the tyre. The brand name/trademark may be the same as that of the manufacturer".

2.4. "*Trade description/commercial name*" means an identification of a range of tyres as given by the tyre manufacturer. It may coincide with the brand name/trademark.

2.5. Category of use:

2.5.1. "*Normal tyre*" means a tyre intended for normal, on-road use;

2.5.2. "*Snow tyre*" means a tyre whose tread pattern, tread compound or structure is primarily designed to achieve in snow conditions a performance better than that of a normal tyre with regard to its ability to initiate or maintain vehicle motion;

2.5.3. "*Special use tyre*" means a tyre intended for mixed use both on- and off-road or for other special duty. These tyres are primarily designed to initiate and maintain the vehicle in motion in off-road conditions;

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[1] As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.6, para. 2. - www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

[2] This Regulation defines requirements for tyres as a component. It does not limit their installation on any categories of vehicles.

* For the purpose of this Regulation, "tyres" means "pneumatic tyres".

2.5.3.1. "*Professional off-road tyre*" is a special use tyre primarily used for service in severe off-road conditions;

2.6. "*Structure*" of a tyre means the technical characteristics of the tyre's carcass. A distinction is made between the following structures in particular:

2.6.1. "*Diagonal*" or "*bias-ply*" describes a tyre structure in which the ply cords extend to the beads and are laid at alternate angles substantially less than 90° to the centreline of the tread;

2.6.2. "*Radial*" describes a tyre structure in which the ply cords extend to the beads and are laid substantially at 90° to the centreline of the tread, the carcass being stabilized by an essentially inextensible circumferential belt;

2.7. "*Bead*" means the part of a tyre which is of such shape and structure as to fit the rim and to hold the tyre on it[3];

2.8. "*Cord*" means the strands forming the fabric of the plies in the tyre[3];

2.9. "*Ply*" means a layer of rubber-coated parallel cords[3];

2.10. "*Carcass*" means that part of a tyre other than the tread and the rubber sidewalls which, when inflated, bears the load[3];

2.11. "*Tread*" means that part of a tyre which comes into contact with the ground, protects the carcass against mechanical damage and contributes to ground adhesion[3];

2.12. "*Sidewall*" means the part of a tyre between the tread and the area designed to be covered by the rim flange[3];

2.13. "*Lower sidewall*" means the area included between the line of maximum section width of the tyre and the area designed to be covered by the rim flange[3];

2.13.1. However, in case of tyres identified by the "tyre to rim fitment configuration" (see paragraph 3.1.12.) symbol "A", it means the area of the tyre which is seating on the rim;

2.14. "*Tread groove*" means the space between two adjacent ribs and/or blocks in the tread pattern[3];

2.15. "*Section width (S)*" means the linear distance between the outsides of the sidewalls of an inflated tyre, excluding elevations due to labelling (marking), decoration or protective bands or ribs[3];

2.16. "*Over-all width*" means the linear distance between the outsides of the sidewalls of an inflated tyre, including labelling (marking), decoration and protective bands or ribs[3];

2.17. "*Section height (H)*" means a distance equal to half the difference between the outer diameter of the tyre and the nominal rim diameter;

2.18. "*Nominal aspect ratio (Ra)*" means one hundred times the number obtained by dividing the number expressing the section height (H) by the number expressing the nominal section width (S_1), both dimensions expressed in the same units;

2.19. "*Outer diameter (D)*" means the overall diameter of an inflated new tyre[3];

[3] See explanatory figure.

2.20. "*Tyre-size designation*" means:

2.20.1. A designation showing:

2.20.1.1. The nominal section width (S_1). This width must be expressed in mm, except in the case of types of tyre for which the size designation is shown in the first column of the tables in Annex 5 to this Regulation;

2.20.1.2. The nominal aspect ratio, except in the case of certain types of tyre for which the size designation is shown in the first column of the tables in Annex 5 to this Regulation or, depending on the tyre design type, the nominal outer diameter expressed in mm;

2.20.1.3. A conventional number "d" (the "d" symbol) denoting the nominal diameter of the rim and corresponding to its diameter expressed either in codes (number below 100) or in millimetres (numbers above 100). Numbers corresponding to both types of measurement may be used together in the designation;

2.20.1.3.1. The values of the "d" symbols expressed in millimetres are shown below:

Nominal rim diameter code ("d" symbol)	*Value of the "d" symbol expressed in mm*
8	203
9	229
10	254
11	279
12	305
13	330
14	356
15	381
16	406
17	432
18	457
19	483
20	508
21	533
22	559
24	610
25	635
14.5	368
16.5	419
17.5	445
19.5	495
20.5	521
22.5	572
24.5	622
26	660
28	711
30	762

2.20.1.4. An indication of the tyre to rim fitment configuration when it differs from the standard configuration and is not already expressed by the symbol "d" denoting the nominal rim diameter code;

2.21. "*Nominal rim diameter (d)*" means the diameter of the rim on which a tyre is designed to be mounted[3];

2.22. "*Rim*" means the support for a tyre-and-tube assembly, or for a tubeless tyre, on which support the tyre beads are seated[3];

2.23. "*Theoretical rim*" means a rim whose width would be equal to x times the nominal section width of a tyre; the value of x shall be specified by the manufacturer of the type;

2.24. "*Measuring rim*" means the rim on which a tyre must be fitted for dimensional measurements;

2.25. "*Test rim*" means the rim on which a tyre must be fitted for load/speed endurance testing;

2.26. "*Chunking*" means the breaking away of pieces of rubber from the tread;

2.27. "*Cord separation*" means the parting of the cords from their coating;

2.28. "*Ply separation*" means the parting of adjacent plies;

2.29. "*Tread separation*" means the pulling away of the tread from the carcass;

2.30. "*Load-capacity index*" means one or two numbers which indicate the load the tyre can carry in single or in single and dual operation at the speed corresponding to the associated speed category and when operated in conformity with the requirements governing utilization specified by the manufacturer. A type of tyre can have either one or two sets of load capacity indices depending on whether or not the provisions of paragraph 6.2.5. are applied. The list of these indices and their corresponding loads is given in Annex 4;

2.31. "*Speed category*" means:

2.31.1. The speeds, indicated by a symbol, at which the tyre can carry the load indicated by the associated load-capacity index;

2.31.2. The speed categories are as shown in the table below[4]:

Speed-category symbol	*Corresponding speed (km h)*
F	80
G	90
J	100
K	110
L	120
M	130
N	140
P	150
Q	160

[4] For consistency, the symbols and speeds shown in this table are the same as those for passenger cars (as in Regulation No. 30). They should not be taken to indicate the speeds at which commercial vehicles fitted with such tyres may be operated on the roads.

Speed-category symbol	*Corresponding speed (km/h)*
R	170
S	180
T	190
U	200
H	210

2.32. "*Table load-capacity variation with speed*" means:

The table, in Annex 8, showing as a function of the load-capacity indices and nominal-speed-category symbols the load variations which a tyre can withstand when used at speeds different from that conforming to its nominal-speed-category symbol. The load variations do not apply in the case of the additional load capacity symbol and speed category obtained when the provisions of paragraph 6.2.5. are applied;

2.33. "*Void to fill ratio*" means the ratio between the area of voids in a reference surface and the area of this reference surface calculated from the mould drawing;

2.34. "*Tyre Class*" means one of the following groupings:

2.34.1. *Class C2 tyres*: Tyres identified by a load capacity index in single formation lower or equal to 121 and a speed category symbol higher or equal to "N";

2.34.2. *Class C3 tyres*: Tyres identified by:

(a) A load capacity index in single formation higher or equal to 122; or

(b) A load capacity index in single formation lower or equal to 121 and a speed category symbol lower or equal to "M".

3. Markings

3.1. Tyres submitted for approval shall bear on both side walls in the case of symmetrical tyres and at least on the outer side wall in the case of asymmetrical tyres:

3.1.1. The manufacturer's name or the Brand name/trademark;

3.1.2. The trade description/commercial name (see paragraph 2.4. of this Regulation). However, the trade description is not required when it coincides with the Brand name/trademark.

3.1.3. The tyre-size designation as defined in paragraph 2.20. of this Regulation;

3.1.4. An indication of the structure as follows:

3.1.4.1. On diagonal (bias-ply) tyres: no indication, or the letter "D";

3.1.4.2. On radial-ply tyres: the letter "R" placed in front of the rim-diameter marking and, optionally, the word "RADIAL";

3.1.5. The speed-category symbol (or symbols);

3.1.5.1. An indication of the tyre's nominal speed category in the form of the symbol prescribed in paragraph 2.31.2. above;

3.1.5.2. An indication of a second speed category in cases where paragraph 6.2.5. below is applied;

3.1.6. The inscription M+S or M.S or M&S if the tyre is classified in the category of use "snow tyre" or if the tyre is classified in the category of use "special use tyre" when declared by the tyre manufacturer at paragraph 4.1.3. as complying also with the definition given in paragraph 2.5.2.;

3.1.7. The load-capacity indices as defined in paragraph 2.30. of this Regulation;

3.1.8. The word "TUBELESS" if the tyre is designed for use without an inner tube;

3.1.9. The date of manufacture in the form of a group of four digits, the first two showing the week and the last two the year of manufacture. However, this marking, which it is permissible to restrict to one sidewall, shall not be mandatory, on any tyre submitted for approval, until two years after the date of entry into force of this Regulation[5];

3.1.10. In the case of tyres which can be regrooved, the symbol " " at least 20 mm in diameter, or the word "REGROOVABLE", moulded into or on to each sidewall;

3.1.11. An indication, by the "PSI" index, of the inflation pressure to be adopted for the load/speed endurance tests, as explained in Annex 7, Appendix 2. However, this indication, which it is permissible to restrict to one sidewall, shall not be mandatory, on any tyre submitted for approval, until two years after the date of entry into force of this Regulation.

For tyres first approved after 1 January 2018, the Inflation pressure for the dimension measurement and for the load/speed endurance test, pursuant to paragraph 4.1.12. of this Regulation, shall be indicated in kilopascals, replacing the "PSI" index.

It is allowed to use kPa marking instead of PSI for tyres first type approved before 1 January 2018.;

3.1.12. In the case of tyres first approved after 1 March 2004 the identification referred to in paragraph 2.20.1.4. shall be placed only immediately after the rim diameter marking referred to in paragraph 2.20.1.3;

3.1.13. The inscription "MPT" (or alternatively "ML" or "ET") and /or "POR" if the tyre is classified in the category of use "special use tyre". In addition, they may also bear the inscription M+S or M.S or M&S.

"ET" means Extra Tread, "ML" stands for Mining and Logging, "MPT" means Multi-Purpose Truck and "POR" means Professional Off Road [6];

3.1.14. The prefix "LT" before the tyre size designation, or the suffix "C" or "LT" after the rim diameter marking referred to in paragraph 2.20.1.3., and, if applicable, after the tyre to rim fitment configuration referred to in paragraph 2.20.1.4., or the suffix "LT" after the service description.

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[5] Before 1 January 2000, the date of manufacture may be indicated by a group of three digits, the first two showing the week and the last one the year of manufacture.

[6] This marking shall only be mandatory for tyre types approved to this Regulation after the entry into force of Supplement 14 to the Regulation.

3.1.14.1. This marking is optional in the case of tyres fitted on 5° drop centre rims, suitable for single and dual fitment, having a load capacity index in single lower or equal to 121 and destined for the equipment of motor vehicles;

3.1.14.2. This marking is mandatory in the case of tyres fitted on 5° drop centre rims, suitable for single fitment only, having a load capacity index higher or equal to 122 and destined for the equipment of motor vehicles;

3.1.15. The suffix "CP" after the rim diameter marking referred to in paragraph 2.20.1.3., and, if applicable, after the tyre to rim fitment configuration referred to in paragraph 2.20.1.4. This marking is mandatory in the case of tyres fitted on 5° drop centre rims, having a load capacity index in single lower or equal to 121 and specifically designed for the equipment of motor caravans;

3.1.16. The inscription "FRT" (Free Rolling Tyre) in case of tyres designed for the equipment of trailer axles and axles of motor vehicles other than front steering and drive axles.

3.2. Tyres shall exhibit a free space sufficiently large to accommodate an approval mark as shown in Annex 2 to this Regulation.

3.3. Annex 3 to this Regulation gives an example of an arrangement of the tyre markings.

3.4. The markings referred to in paragraph 3.1. and the approval mark prescribed in paragraph 5.4. of this Regulation shall be moulded on to or into the tyres. They shall be clearly legible and shall, except for the marking referred to in paragraph 3.1.1., 3.1.2. and 3.1.13. above, be located on at least one lower sidewall.

3.4.1. However, for tyres identified by the "tyre to rim fitment configuration" (see paragraph 3.1.12.) symbol "A", the markings may be placed anywhere on the sidewall of the tyre.

4. Application for approval

4.1. The application for approval of a type of tyre with regard to this Regulation shall be submitted by the tyre manufacturer or by his duly accredited representative. It shall specify:

4.1.1. The tyre-size designation;

4.1.2. The manufacturer's name;

4.1.2.1. The Brand name(s)/trademark(s);

4.1.2.2. The trade description(s)/commercial name(s).

4.1.3. Category of use (normal tyre, snow tyre, special use tyre);

4.1.3.1. For the tyres belonging to the category of use "special use tyre" those which may bear the inscription M+S or M.S or M&S.

4.1.4. Structure: diagonal (bias ply) or radial;

4.1.5. The speed category;

4.1.6. The load-capacity indexes;

4.1.7. Whether the tyre is intended to be used with or without an inner tube;

4.1.8. The overall dimensions: overall section width and outer diameter;

4.1.9. The factor "x" referred to in paragraph 2.23. above;

4.1.10. The rims on which the tyre can be mounted;

4.1.11. The measuring rim and test rim;

4.1.12. The inflation pressure for the dimension measurement and for the load/speed endurance test pressure;

4.1.13. The additional load/speed combinations in cases where paragraph 6.2.5. below is applied.

4.2. The application for approval shall be accompanied (all in triplicate) by a sketch, or a representative photograph, which identify the tyre tread pattern and a sketch of the envelope of the inflated tyre mounted on the measuring rim showing the relevant dimensions (see paragraphs 6.1.1. and 6.1.2.) of the type submitted for approval. It shall also be accompanied either by the test report issued by the approved test laboratory or by one or two samples of the tyre type, at the discretion of the competent authority. Drawings or photographs of the side wall and tread of the tyre shall be submitted once production has been established, no later than one year after the date of issue of the type approval.

4.3. The competent authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.

4.4. Where a tyre manufacturer submits application for type approval for a range of tyres, it is not considered necessary to carry out a load/speed test on every type of tyre in the range. Worst case selection may be made at the discretion of the approval authority.

5. Approval

5.1. If the type of tyre submitted for approval in pursuance of this Regulation meets the requirements of paragraph 6. below, approval of that type of tyre shall be granted.

5.2. An approval number shall be assigned to each type approved; its first two digits (at present 00 for the Regulation in its original form) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party may not assign the same number to another type of tyre.

5.3. Notice of approval or of refusal of approval of a type of tyre pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to the model in Annex 1 to this Regulation.

5.4. There shall be affixed, conspicuously, to every tyre conforming to a type of tyre approved under this Regulation, in the space referred to in paragraph 3.2. above and in addition to the markings prescribed in paragraph 3.1. above, an international approval mark consisting of:

5.4.1. A circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval[6]; and

5.4.2. An approval number.

5.5. The approval mark shall be clearly legible and be indelible.

5.6. Annex 2 to this Regulation gives an example of the arrangement of the approval mark.

5.7. Subsequent retreading in accordance with Regulation No. 109

In the case where, during the course of production of a particular tyre type, the manufacturer has obtained a new approval for that same tyre type to be marked with a service description indicating a higher load index or different speed symbol than the earlier marking and where the tyre manufacturer authorizes the earlier tyre type to be retreaded and marked with the later service description, the tyre manufacturer shall complete the Communication document given in Annex 9 to this Regulation and shall submit this to the Type Approval Authority that has granted the new approval. If the authorization for upgrading only applies to tyres from a particular manufacturing plant, or produced during particular production periods, the information necessary to identify the tyres shall be stated on the Communication document.

The Type Approval Authority shall communicate this information to other Parties to the Agreement which apply this Regulation and tyre manufacturers or Type Approval Authorities shall release this information on the request of any retreading production unit that is approved in accordance with Regulation No. 109.

6. Specifications

6.1. Dimensions of tyres

6.1.1. Section width of a tyre

6.1.1.1. The section width shall be obtained by means of the following formula:

$S = S1 + K (A - A1)$,

Where:

S is the "section width" rounded to the nearest millimetre and measured on the measuring rim;

S1 is "the nominal section width" in millimetres, as shown on the sidewall of the tyre in the tyre designation as prescribed;

A is the width of the measuring rim in millimetres, as shown by the manufacturer in the descriptive note; and

A1 is the width of the theoretical rim in millimetres.

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[6] The distinguishing numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to the Consolidated Resolution on the Construction of Vehicles (R.E.3), document ECE/TRANS/WP.29/78/Rev.6/Amend.3 - www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html

A1 shall be taken to equal S1 multiplied by the factor x as specified by the manufacturer, and K shall be taken to equal 0.4.

6.1.1.2. However, for the types of tyres whose designation is given in the first column of the tables in Annex 5 to this Regulation, the section width shall be deemed to be that given opposite the tyre designation in those tables.

6.1.1.3. However, for tyres identified by the "tyre to rim fitment configuration" (see paragraph 3.1.12.) symbol "A", K shall be taken to equal 0.6.

6.1.2. Outer diameter of a tyre

6.1.2.1. The outer diameter of a tyre shall be obtained by means of the following formula:

$D = d + 2H$

where:

D is the outer diameter expressed in millimetres;

d is the conventional number defined in paragraph 2.20.1.3. above, expressed in millimetres;

H is the nominal section height rounded to the nearest millimetre and is equal to

$H = S1 \cdot 0.01 Ra$, where

S1 is the nominal section width in millimetres;

Ra is the nominal aspect ratio;

all as shown on the sidewall of the tyre in the tyre-size designation in conformity with the requirements of paragraph 3.4. above.

6.1.2.2. However, for the types of tyres whose designation is given in the first column of the tables in Annex 5 to this Regulation, the outer diameter shall be deemed to be that given opposite the tyre designation in those tables.

6.1.2.3. However, for tyres identified by the "tyre to rim fitment configuration" (see paragraph 3.1.12.) symbol "A", the outer diameter shall be that specified in the tyre-size designation as shown on the sidewall of the tyre.

6.1.3. Method of measuring tyres

The dimensions of tyres shall be measured by the procedure described in Annex 6 to this Regulation.

6.1.4. Tyre section width specifications

6.1.4.1. The overall width of a tyre may be less than the section width or widths determined pursuant to paragraph 6.1.1. above.

6.1.4.2. It may exceed that value by 4 per cent in case of radial-ply tyres and by 8 per cent in the case of diagonal (bias-ply) tyres. However, for tyres intended for dual mounting (twinning) listed in column A of the following table, the overall width of the tyre may exceed the value determined pursuant to paragraph 6.1.1. above taking into account the tolerances listed in column B; different specific tolerances are listed in annex 5 Part II in footnotes of the relevant tables. The respective limits shall be rounded to the nearest millimetre (mm).

A	B
radial metric tyres with nominal section width exceeding 305 mm and aspect ratio higher than 60	2%
radial tyres listed in Annex 5 Part 1 with section width exceeding 305 mm	2%
diagonal (bias-ply) metric tyres with nominal section width exceeding 305 mm	4%
diagonal (bias-ply) tyres listed in Annex 5 Part 1 with section width exceeding 305 mm	4%

6.1.4.3. However, for tyres identified by the "tyre to rim fitment configuration" (see paragraph 3.1.12.) symbol "A", the overall width of the tyre, in the lower area of the tyre, equals the nominal width of the rim on which the tyre is mounted, as shown by the manufacturer in the descriptive note, increased by 27 mm.

6.1.5. Tyre outer diameter specifications

The outer diameter of a tyre must not be outside the values D_{min} and D_{max} obtained from the following formulae:

$D_{min} = d + 2 \cdot H_{min}$

$D_{max} = d + 2 \cdot H_{max}$

Where:

$H_{min} = H \cdot a$ rounded to the nearest mm

$H_{max} = H \cdot b$ rounded to the nearest mm

and

6.1.5.1. For sizes listed in Annex 5 and for tyres identified by the "tyre to rim fitment configuration" (see paragraph 3.1.12.) symbol "A", the nominal section height H is equal to:

$H = 0.5 (D-d)$, rounded to the nearest mm - for references see paragraph 6.1.2.1.

6.1.5.2. For other sizes, not listed in Annex 5

"H" and "d" are as defined in paragraph 6.1.2.1.

6.1.5.3. Coefficients "a" and "b" are respectively:

6.1.5.3.1. Coefficient "a" = 0.97

6.1.5.3.2. Coefficient "b"	Radial	Diagonal
For normal use tyres	1.04	1.07
For special use tyres	1.06	1.09

6.1.5.3.3. For tyres of the category of use "snow tyre" the outer diameter shall not exceed the following value

$D_{max\,snow} = 1.01 \cdot D_{max}$ rounded to the nearest mm

where D_{max} is the maximum outer diameter established in conformity with the above.

6.2. Load/speed endurance test

6.2.1. Each type of tyre shall undergo at least one load/speed endurance tests carried out by the procedure described in Annex 7 to this Regulation.

6.2.2. A tyre which, after undergoing the endurance test, does not exhibit any tread separation, ply separation, cord separation, chunking or broken cords shall be deemed to have passed the test.

6.2.3. The outer diameter of the tyre, measured six hours after the load/speed endurance test, must not differ by more than 3.5 per cent from the outer diameter as measured before the test.

6.2.4. Where application is made for the approval of a type of tyre for the load/speed combinations given in the table in Annex 8, the endurance test prescribed in paragraph 6.2.1. above need not be carried out for load and speed values other than the nominal values.

6.2.5. Where application is made for the approval of a type of tyre which has a load/speed combination in addition to the one that is subject to the variation of load with speed given in the table in Annex 8, the endurance test prescribed in paragraph 6.2.1. above shall also be carried out on a second tyre of the same type at the additional load/speed combination.

6.3. Tread pattern of a tyre

6.3.1. In order to be classified as a "special use tyre" a tyre shall have a block tread pattern in which the blocks are larger and more widely spaced than for normal tyres and have the following characteristics:

For C2 tyres: a tread depth $\geq$ 11 mm and void to fill ratio $\geq$ 35 per cent
For C3 tyres: a tread depth $\geq$ 16 mm and void to fill ratio $\geq$ 35 per cent

6.3.2. In order to be classified as a 'professional off-road tyre', a tyre shall have all of the following characteristics:

(a) For C2 tyres:

(i) A tread depth $\geq$ 11 mm;

(ii) A void to fill ratio $\geq$ 35 per cent;

(iii) A maximum speed rating of $\leq$ Q.

(b) For C3 tyres:

(i) A tread depth $\geq$ 16 mm;

(ii) A void to fill ratio $\geq$ 35 per cent;

(iii) A maximum speed rating of $\leq$ K.

7. Modification and extension of approval of a tyre type

7.1. Every modification of a tyre type shall be notified to the Type Approval Authority which approved the tyre type. That Authority may then either:

7.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the tyre still meets the requirements; or

7.1.2. Require a further test report from the Technical Service responsible for carrying out the tests.

7.2. A modification of the tread pattern of the tyre shall not be considered to necessitate a repetition of the tests prescribed in paragraph 6. of this Regulation.

7.3. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 5.3. above to the Parties to the Agreement which apply this Regulation.

7.4. The competent Type Approval Authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.

8. Conformity of production

The conformity of production procedures shall comply with those set out in the Agreement, Schedule 1 (E/ECE/TRANS/505/Rev.3), with the following requirements:

8.1. Tyres approved under this Regulation shall be so manufactured as to conform to the type approved, by meeting the requirements set forth in paragraph 6. above.

8.2. The Type Approval Authority which has granted type approval may at any time verify the conformity control methods applied in each production facility. For each production facility, the normal frequency of these verifications shall be once every two years.

9. Penalties for non-conformity of production

9.1. The approval granted in respect of a type of tyre pursuant to this Regulation may be withdrawn if the requirement laid down in paragraph 8.1. above is not complied with or if the tyres taken from the series have failed to pass the tests prescribed in that paragraph.

9.2. If a Party to the Agreement which applies this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation, by means of a communication form conforming to the model in annex 1 to this Regulation.

10. Production definitively discontinued

If the holder of an approval completely ceases to manufacture a type of tyre approved in accordance with this Regulation, he shall so inform the Type Approval Authority which granted the approval. Upon receiving the relevant communication that Authority shall inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of copies of the communication form conforming to the model in Annex 1 to this Regulation.

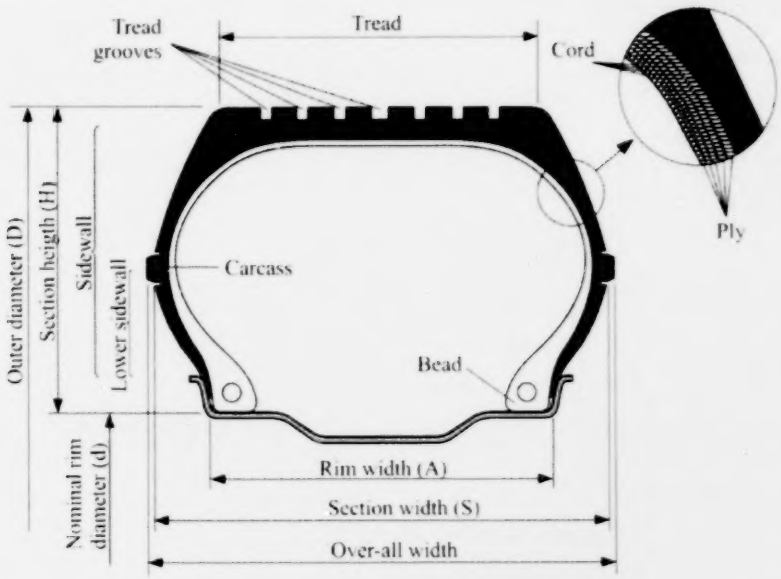
11. Names and addresses of Technical Services responsible for conducting approval tests, of test laboratories, and of Type Approval Authorities

11.1. The Contracting Parties to the 1958 Agreement which apply this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and, where applicable, of the approved test laboratories and of the Type Approval Authorities which grant approval and to which forms certifying approval or extension of approval or refusal of approval or withdrawal of approval or production definitively discontinued, issued in other countries, are to be sent.

11.2. The Contracting Parties to the 1958 Agreement which apply this Regulation may designate laboratories of tyre manufacturers, as approved, test laboratories.

11.3. Where a Contracting Party to the 1958 Agreement applies paragraph 11.2. above, it may, if it so desires, be represented at the tests by one or more persons of its choice.

Explanatory figure
(See paragraph 2. of the Regulation)



Annex 1

Communication

(Maximum format: A4 (210 x 297 mm))

issued by: Name of administration:
.....
.....
.....

concerning[2]: Approval granted
Approval extended
Approval refused
Approval withdrawn
Production definitively discontinued

of a type of pneumatic tyre for motor vehicles pursuant to Regulation No. 54

Approval No. ..... Extension No. .....

1. Manufacturer's name and address: .....
2. Tyre type designation[3]: .....
2.1. Brand name(s)/trademark(s): .....
2.2. Trade description(s)/ Commercial name(s)/ .....
3. If applicable, name and address of manufacturer's representative: .....
.....
.....
4. Summarized description:
4.1. Size of tyre .....
4.2. Category of use: normal/snow/special[2]
4.3. Structure: diagonal (bias-ply)/radial[2]
4.4. Tyre class: C2 / C3[2]
4.5. Speed category symbol:
4.5.1. Nominal: .....

---

[1] Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).
[2] Strike out what does not apply.
[3] A list of brand name(s)/trademark(s) or Trade description(s)/ Commercial name(s) may be annexed to this communication

4.5.2. Additional (if applicable): .....

4.6. Load-capacity indices:

4.6.1. Corresponding to nominal speed: single ..... twinned (dual) .....

4.6.2. Corresponding to additional speed: single ..... twinned (dual) .....

5. Technical Service and, where applicable, test laboratory approved for purposes of approval or of verification of conformity:.....

.....

6. Date of report issued by that Service:.....

7. Number of report issued by that Service: .....

8. Reasons(s) of extension (if applicable): .....

9. Any remarks:.....

10. Place:.....

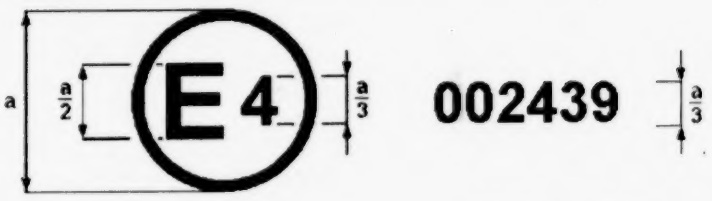
11. Date:.....

12. Signature: .....

13. Annexed to this communication is a list of documents in the approval file deposited at the Type Approval Authorities having delivered the approval and which can be obtained upon request.

Annex 2

Arrangement of approval mark



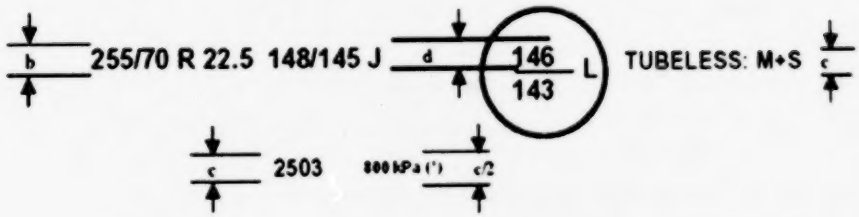
a = 12 mm (min.)

The above approval mark affixed to a tyre shows that the type of tyre concerned has been approved in the Netherlands (E 4) under approval number 002439. The first two digits of the approval number indicate that the approval was granted in accordance with the requirements of UN Regulation No. 54 in its original form

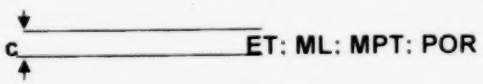
Note: The approval number must be placed close to the circle and either above or below the "E" or to left or right of that letter. The digits of the approval number must be on the same side of the "E" and face in the same direction. The use of Roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols.

Annex 3

Arrangement of tyre markings



(*) PSI marking instead of kPa is allowed for tyres first type approved before 1 January 2018



	Minimum heights of markings (mm)
b	6
c	4
d	6

1. These markings define a tyre:

Having a nominal section width of 255;

Having a nominal aspect ratio of 70;

Of radial-ply structure (R);

Having a nominal rim diameter of 572 mm, for which the symbol is 22.5;

Having load capacities of 3,150 kg when single and 2,900 kg when twinned (dual), corresponding respectively to the load indices 148 and 145 shown in Annex 4 to this Regulation;

Having a reference speed of 100 km/h corresponding to speed category symbol: J;

Classified in the category of use Snow: M+S;

Able to be used additionally at 120 km/h (speed category symbol L) with a load capacity of 3,000 kg when single and 2,725 kg when twinned (dual), corresponding respectively to the load indices 145 and 143 shown in Annex 4 to this Regulation;

Capable of being fitted without inner tube: "TUBELESS";

Manufactured during the twenty-fifth week of the year 2003, and

Requiring to be inflated to 800 kPa for load/speed endurance tests, for which the PSI symbol is 90.

2. In the particular case of tyres having a tyre to rim fitment configuration "A", the marking shall be in the form of the following example:

235-700 R 450A

Where:

235 is the nominal section width in mm

700 is the outer diameter expressed in mm

R is an indication of the structure of the tyre - see paragraph 3.1.4. of this Regulation

450 is the nominal diameter of the rim expressed in mm

A is the tyre to rim fitment configuration.

The marking of the load index, speed category symbol, date of manufacture and other markings, shall be as given in the example above.

3. The positioning and order of the markings constituting the tyre designation shall be the following:

(a) The tyre-size designation as defined in paragraph 2.20. of this Regulation shall be grouped as shown in the example above: 255/70 R 22.5 or 235-700 R 450A;

(b) The service description comprising the load index/indices and the speed symbol shall be placed immediately after the tyre-size designation as defined in paragraph 2.20. of this Regulation;

(c) The symbols "TUBELESS" and "M+S" or "FRT" or "MPT" (and equivalents) may be at a distance from the tyre-size designation

(d) If paragraph 6.2.5. of this Regulation is applied, the additional load-capacity indices and speed-category symbol must be shown inside a circle near the nominal load-capacity indices and speed-category-symbol appearing on the tyre sidewall.

Annex 4

List of symbols of load-capacity indices

LI	*kg*	*LI*	*kg*	*LI*	*kg*	*LI*	*kg*	*LI*	*kg*	*LI*	*kg*	*LI*	*kg*
0	45	40	140	80	450	120	1 400	160	4 500	200	14 000	240	45 000
1	46.2	41	145	81	462	121	1 450	161	4 625	201	14 500	241	46 250
2	47.5	42	150	82	475	122	1 500	162	4 750	202	15 000	242	47 500
3	48.7	43	155	83	487	123	1 550	163	4 875	203	15 500	243	48 750
4	50	44	160	84	500	124	1 600	164	5 000	204	16 000	244	50 000
5	51.5	45	165	85	515	125	1 650	165	5 150	205	16 500	245	51 500
6	53	46	170	86	530	126	1 700	166	5 300	206	17 000	246	53 000
7	54.5	47	175	87	545	127	1 750	167	5 450	207	17 500	247	54 500
8	56	48	180	88	560	128	1 800	168	5 600	208	18 000	248	56 000
9	58	49	185	89	580	129	1 850	169	5 800	209	18 500	249	58 000
10	60	50	190	90	600	130	1 900	170	6 000	210	19 000	250	60 000
11	61.5	51	195	91	615	131	1 950	171	6 150	211	19 500	251	61 500
12	63	52	200	92	630	132	2 000	172	6 300	212	20 000	252	63 000
13	65	53	206	93	650	133	2 060	173	6 500	213	20 600	253	65 000
14	67	54	212	94	670	134	2 120	174	6 700	214	21 200	254	67 000
15	69	55	218	95	690	135	2 180	175	6 900	215	21 800	255	69 000
16	71	56	224	96	710	136	2 240	176	7 100	216	22 400	256	71 000
17	73	57	230	97	730	137	2 300	177	7 300	217	23 000	257	73 000
18	75	58	236	98	750	138	2 360	178	7 500	218	23 600	258	75 000
19	77.5	59	243	99	775	139	2 430	179	7 750	219	24 300	259	77 500
20	80	60	250	100	800	140	2 500	180	8 000	220	25 000	260	80 000
21	82.5	61	257	101	825	141	2 575	181	8 250	221	25 750	261	82 500
22	85	62	265	102	850	142	2 650	182	8 500	222	26 500	262	85 000
23	87.5	63	272	103	875	143	2 725	183	8 750	223	27 250	263	87 500
24	90	64	280	104	900	144	2 800	184	9 000	224	28 000	264	90 000
25	92.5	65	290	105	925	145	2 900	185	9 250	225	29 000	265	92 500
26	95	66	300	106	950	146	3 000	186	9 500	226	30 000	266	95 000
27	97.5	67	307	107	975	147	3 075	187	9 750	227	30 750	267	97 500
28	100	68	315	108	1 000	148	3 150	188	10 000	228	31 500	268	100 000
29	103	69	325	109	1 030	149	3 250	189	10 300	229	32 500	269	103 000
30	106	70	335	110	1 060	150	3 350	190	10 600	230	33 500	270	106 000
31	109	71	345	111	1 090	151	3 450	191	10 900	231	34 500	271	109 000
32	112	72	355	112	1 120	152	3 550	192	11 200	232	35 500	272	112 000
33	115	73	365	113	1 150	153	3 650	193	11 500	233	36 500	273	115 000
34	118	74	375	114	1 180	154	3 750	194	11 800	234	37 500	274	118 000
35	121	75	387	115	1 215	155	3 875	195	12 150	235	38 750	275	121 500
36	125	76	400	116	1 250	156	4 000	196	12 500	236	40 000	276	125 000
37	128	77	412	117	1 285	157	4 125	197	12 850	237	41 250	277	128 500
38	132	78	425	118	1 320	158	4 250	198	13 200	238	42 500	278	132 000
39	136	79	437	119	1 360	159	4 375	199	13 600	239	43 750	279	136 000

Annex 5

Tyre-size designation and dimensions

Part I - European tyres

Table A
Code designated sizes mounted on 5° tapered rims or flat base rims.
Radial and diagonal constructions

Tyre-size designation (*)	*Measuring rim width code*	*Nominal rim diameter d (cm)*	*Outer diameter D (mm)*		*Section width S (mm)*	
			Radial	*Diagonal*	*Radial*	*Diagonal*
Std. series						
4.00R8 (*)	2.50	203	414	414	107	107
4.00R10(*)	3.00	254	466	466	108	108
4.00R12(*)	3.00	305	517	517	108	108
4.10/3.50-6	2.50	152	-	320	-	95
3.50-8	2.50	203	-	394	-	103
4.40-10	3.50	254	-	480	-	124
4.50R8 (*)	3.50	203	439	439	125	125
4.50R10(*)	3.50	254	490	490	125	125
4.50R12(*)	3.50	305	545	545	125	128
5.00R8 (*)	3.00	203	467	467	132	132
5.00R10(*)	3.50	254	516	516	134	134
5.00R12(*)	3.50	305	568	568	134	137
6.00R9	4.00	229	540	540	160	160
6.00R14C	4.50	356	626	625	158	158
6.00R16(*)	4.50	406	728	730	170	170
6.50R10	5.00	254	588	588	177	177
6.50R14C	5.00	356	640	650	170	172
6.50R16(*)	4.50	406	742	748	176	176
6.50R20(*)	5.00	508	860	-	181	-
7.00R12	5.00	305	672	672	192	192
7.00R14C	5.00	356	650	668	180	182
7.00R15(*)	5.00	381	746	752	197	198
7.00R16C	5.50	406	778	778	198	198
7.00R16	5.50	406	784	774	198	198
7.00R20	5.50	508	892	898	198	198
7.50R10	5.50	254	645	645	207	207
7.50R14C	5.50	356	686	692	195	192
7.50R15(*)	6.00	381	772	772	212	212
7.50R16(*)	6.00	406	802	806	210	210
7.50R17(*)	6.00	432	852	852	210	210
7.50R20	6.00	508	928	928	210	213
8.25R15	6.50	381	836	836	230	234
8.25R16	6.50	406	860	860	230	234
8.25R17	6.50	432	886	895	230	234

Tyre-size designation (+)	*Measuring rim width code*	*Nominal rim diameter d (mm)*	*Outer diameter D (mm)*		*Section width S (mm)*	
8.25R20	6.50	508	962	970	230	234
9.00R15	6.00	381	840	840	249	249
9.00R16(*)	6.50	406	912	900	246	252
9.00R20	7.00	508	1018	1012	258	256
10.00R15	7.50	381	918	918	275	275
10.00R20	7.50	508	1052	1050	275	275
10.00R22	7.50	559	1102	1102	275	275
11.00R16	6.50	406	980	952	279	272
11.00R20	8.00	508	1082	1080	286	291
11.00R22	8.00	559	1132	1130	286	291
11.00R24	8.00	610	1182	1180	286	291
12.00R20	8.50	508	1122	1120	313	312
12.00R22	8.50	559	1174	1174	313	312
12.00R24	8.50	610	1226	1220	313	312
13.00R20	9.00	508	1176	1170	336	342
14.00R20	10.00	508	1238	1238	370	375
14.00R24	10.00	610	1340	1340	370	375
16.00R20	13.00	508	1370	1370	446	446
80 Series						
12/80 R 20	8.50	508	1008	-	305	-
13/80 R 20	9.00	508	1048	-	326	-
14/80 R 20	10.00	508	1090	-	350	-
14/80 R 24	10.00	610	1192	-	350	-
14.75/80 R 20	10.00	508	1124	-	370	-
15.5/80 R 20	10.00	508	1158	-	384	-
Wide Base Tyres for Multipurpose Trucks						
7.50 R 18 MPT	5.50	457		885	-	208
10.5 R 18 MPT	9	457		905	276	270
10.5 R 20 MPT	9	508		955	276	270
12.5 R 18 MPT	11	457		990	330	325
12.5 R 20 MPT	11	508		1040	330	325
14.5 R 20 MPT	11	508		1095	362	355
14.5 R 24 MPT	11	610		1195	362	355

(+) Tyres in diagonal construction are identified by an hyphen in place of the letter 'R' (e.g. 5.00-8).

(*) The tyre-size designation may be supplemented with the letter 'C' (e.g. 6.00-16C).

Table B
Code designated sizes mounted on 15° tapered rims - Radial

Tyre-size designation	*Measuring rim width code*	*Nominal rim diameter d (mm)*	*Outer diameter D (mm)*	*Section width S (mm)*
7 R 17.5 (*)	5.25	445	752	185
7 R 19.5	5.25	495	800	185
8 R 17.5 (*)	6.00	445	784	208
8 R 19.5	6.00	495	856	208
8 R 22.5	6.00	572	936	208
8.5 R 17.5	6.00	445	802	215
9 R 17.5	6.75	445	820	230
9 R 19.5	6.75	495	894	230
9 R 22.5	6.75	572	970	230
9.5 R 17.5	6.75	445	842	240
9.5 R 19.5	6.75	495	916	240
10 R 17.5	7.50	445	858	254
10 R 19.5	7.50	495	936	254
10 R 22.5	7.50	572	1020	254
11 R 22.5	8.25	572	1050	279
11 R 24.5	8.25	622	1100	279
12 R 22.5	9.00	572	1084	300
13 R 22.5	9.75	572	1124	320
15 R 19.5	11.75	495	998	387
15 R 22.5	11.75	572	1074	387
16.5 R 19.5	13.00	495	1046	425
16.5 R 22.5	13.00	572	1122	425
18 R 19.5	14.00	495	1082	457
18 R 22.5	14.00	572	1158	457
70 Series				
10/70 R 22.5	7.50	572	928	254
11/70 R 22.5	8.25	572	962	279
12/70 R 22.5	9.00	572	1000	305
13/70 R 22.5	9.75	572	1033	330

(*) The tyre-size designation may be supplemented with the letter 'C' (e.g. 7 R 17.5C).

Table C

Tyres for light commercial vehicles - Radial and diagonal constructions

Tyre-size designation (+)	*Measuring rim width code*	*Nominal rim diameter d (mm)*	*Outer diameter D (mm)*		*Section width S (mm)*	
			Radial	*Diagonal*	*Radial*	*Diagonal*
Metric Designated						
145 R 10 C	4.00	254	492	-	147	-
145 R 12 C	4.00	305	542	-	147	-
145 R 13 C	4.00	330	566	-	147	-
145 R 14 C	4.00	356	590	-	147	-
145 R 15 C	4.00	381	616	-	147	-
155 R 12 C	4.50	305	550	-	157	-
155 R 13 C	4.50	330	578	-	157	-
155 R 14 C	4.50	356	604	-	157	-
165 R 13 C	4.50	330	596	-	167	-
165 R 14 C	4.50	356	622	-	167	-
165 R 15 C	4.50	381	646	-	167	-
175 R 13 C	5.00	330	608	-	178	-
175 R 14 C	5.00	356	634	-	178	-
175 R 16 C	5.00	406	684	-	178	-
185 R 13 C	5.50	330	624	-	188	-
185 R 14 C	5.50	356	650	-	188	-
185 R 15 C	5.50	381	674	-	188	-
185 R 16 C	5.50	406	700	-	188	-
195 R 14 C	5.50	356	666	-	198	-
195 R 15 C	5.50	381	690	-	198	-
195 R 16 C	5.50	406	716	-	198	-
205 R 14 C	6.00	356	686	-	208	-
205 R 15 C	6.00	381	710	-	208	-
205 R 16 C	6.00	406	736	-	208	-
215 R 14 C	6.00	356	700	-	218	-
215 R 15 C	6.00	381	724	-	218	-
215 R 16 C	6.00	406	750	-	218	-
245 R 16 C	7.00	406	798	798	248	248
17 R 15 C	5.00	381	678	-	178	-
17 R 380 C	5.00	381	678	-	178	-
17 R 400 C	150 mm	400	698	-	186	-
19 R 400 C	150 mm	400	728	-	200	-
Code Designated						
5.60 R 12 C	4.00	305	570	572	150	148
6.40 R 13 C	5.00	330	648	640	172	172
6.70 R 13 C	5.00	330	660	662	180	180
6.70 R 14 C	5.00	356	688	688	180	180
6.70 R 15 C	5.00	381	712	714	180	180

(+) Tyres in diagonal construction are identified by an hyphen in place of the letter 'R' (e.g. 145-10 C).

Table D

Tyres for special applications - Radial and diagonal construction

Tyre-size designation (*)	*Measuring rim width code*	*Nominal rim diameter d (mm)*	*Outer diameter D (mm)*	*Section width S (mm)*
Code Designated				
15x4 1/2-8	3.25	203	385	122
16x6-8	4.33	203	425	152
16.5x6.5-8	5.375	203	411	165
18x7	4.33	203	462	173
18x7-8	4.33	203	462	173
21x8-9	6.00	229	535	200
21x4	2.32	330	565	113
22x4 1/2	3.11	330	595	132
23x5	3.75	330	635	155
23x9-10	6.50	254	595	225
25x6	3.75	330	680	170
27x10-12	8.00	305	690	255
28x9-15	7.00	381	707	216
Metric designated				
200-15	6.50	381	730	205
250-15	7.50	381	735	250
300-15	8.00	381	840	300

(*) Tyres in radial construction are identified by the letter 'R' in place of the hyphen '-' (e.g. 15x4 1/2 R 8).

Part II - United States tyres

- Tolerances shown at the bottom of the tables apply in place of those shown in paragraphs 6.1.4.2. and 6.1.5.3.
- Outer diameters are listed for the various categories of use: Normal, Snow, Special.

Table A
Tyres for light commercial vehicles (LT tyres)
Diagonal and radial

Tyre-size designation[1]	*Measuring rim width code*	*Nominal rim diameter d (mm)*	*Outer diameter D (mm)*[2]		*Section width S (mm)*[3]
			Normal	*Snow*	
6.00-16LT	4.50	406	732	743	173
6.50-16LT	4.50	406	755	767	182
6.70-16LT	5.00	406	722	733	191
7.00-13LT	5.00	330	647	658	187
7.00-14LT	5.00	356	670	681	187
7.00-15LT	5.50	381	752	763	202
7.00-16LT	5.50	406	778	788	202
7.10-15LT	5.00	381	738	749	199
7.50-15LT	6.00	381	782	794	220
7.50-16LT	6.00	406	808	819	220
8.25-16LT	6.50	406	859	869	241
9.00-16LT	6.50	406	890	903	257
G78-15LT	6.00	381	711	722	212
H78-15LT	6.00	381	727	739	222
L78-15LT	6.50	381	749	760	236
L78-16LT	6.50	406	775	786	236
7-14.5LT[4]	6.00	368	677	-	185
8-14.5LT[4]	6.00	368	707	-	203
9-14.5LT[4]	7.00	368	711	-	241
7-17.5LT	5.25	445	758	769	189
8-17.5LT	5.25	445	788	799	199

[1] Tyres in Radial construction are identified by the letter "R" in place of "-" (e.g. 6.00 R 16LT).
[2] Coefficient "b" for the calculation of Dmax: 1.08.
[3] Overall width may exceed this value up to +8 per cent.
[4] The suffix "MH"' may replace "LT" in the tyre-size designation (e.g. 7-14.5 MH).

Table B
Tyres for light commercial vehicles (high flotation tyres)
Diagonal and radial

Tyre-size designation[1,4]	*Measuring rim width code*	*Nominal rim diameter d (mm)*	*Outer diameter D (mm)*[2]		*Section width S (mm)*[3]
			Highway Tread[5]	*Traction Tread*[5]	
9-15LT	8.00	381	744	755	254
10-15LT	8.00	381	773	783	264
11-15LT	8.00	381	777	788	279
24x7.50-13LT	6.00	330	597	604	191
27x8.50-14LT	7.00	356	674	680	218
28x8.50-15LT	7.00	381	699	705	218
29x9.50-15LT	7.50	381	724	731	240
30x9.50-15LT	7.50	381	750	756	240
31x10.50-15LT	8.50	381	775	781	268
31x11.50-15LT	9.00	381	775	781	290
31x12.50R15LT	10.00	381	775	781	318
31x13.50-15LT	11.00	381	775	781	345
31x15.50-15LT	12.00	381	775	781	390
32x11.50-15LT	9.00	381	801	807	290
33x9.50 R15LT	7.50	381	826	832	240
33x10.50R15LT	8.50	381	826	832	268
33x10.50R17LT	8.50	432	826	832	268
33x10.50R18LT	8.50	457	826	832	268
33x11.50R18LT	9.00	457	826	832	290
33x11.50R20LT	9.00	508	826	832	290
33x12.50-15LT	10.00	381	826	832	318
33x12.50R17LT	10.00	432	826	832	318
33x12.50R18LT	10.00	457	826	832	318
33x12.50R20LT	10.00	508	826	832	318
33x12.50R22LT	10.00	559	826	832	318
33x13.50R15LT	11.00	381	826	832	345
33x15.50R15LT	12.00	381	826	832	390
34x10.50R17LT	8.50	432	851	858	268
34x12.50R18LT	10.00	457	851	858	318
35x11.50R17LT	9.00	432	877	883	290
35x11.50R18LT	9.00	457	877	883	290
35x11.50R20LT	9.00	508	877	883	290
35x12.50-15LT	10.00	381	877	883	318
35x12.50R17LT	10.00	432	877	883	318
35x12.50R18LT	10.00	457	877	883	318
35x12.50R20LT	10.00	508	877	883	318
35x12.50R22LT	10.00	559	877	883	318
35x13.50R15LT	11.00	381	877	883	345
35x13.50R18LT	11.00	457	877	883	345

Tyre-size designation[1,4]	*Measuring rim width code*	*Nominal rim diameter*	*Outer diameter D (mm)*[2]		*Section width S (mm)*[3]
		d (mm)	*Highway Tread*	*Traction Tread*	
35x13.50R20LT	11.00	508	877	883	345
35x14.50R15LT	12.00	381	877	883	372
36x13.50R18LT	11.00	457	902	908	345
36x14.50R15LT	12.00	381	902	908	372
36x14.50R17LT	12.00	432	902	908	372
36x14.50R18LT	12.00	457	902	908	372
36x15.50R15LT	12.00	381	902	908	390
36x15.50R20LT	12.50	508	902	908	395
37x11.50R20LT	9.00	508	928	934	290
37x12.50-15LT	10.00	381	928	934	318
37x12.50 R17LT	10.00	432	928	934	318
37x12.50R18LT	10.00	457	928	934	318
37x12.50R20LT	10.00	508	928	934	318
37x12.50R22LT	10.00	559	928	934	318
37x13.50R15LT	11.00	381	928	934	345
37x13.50R17LT	11.00	432	928	934	345
37x13.50R18LT	11.00	457	928	934	345
37x13.50R20LT	11.00	508	928	934	345
37x13.50R22LT	11.00	559	928	934	345
37x13.50R24LT	11.00	610	928	934	345
37x13.50R26LT	11.00	660	928	934	345
37x14.50-15LT	12.00	381	928	934	372
38x13.50R17LT	11.00	432	953	959	345
38x13.50R20LT	11.00	508	953	959	345
38x13.50R22LT	11.00	559	953	959	345
38x13.50R24LT	11.00	610	953	959	345
38x14.50R17LT	12.00	432	953	959	372
38x14.50R18LT	12.00	457	953	959	372
38x14.50R20LT	12.00	508	953	959	372
38x15.50R15LT	12.00	381	953	959	390
38x15.50R17LT	12.00	432	953	959	390
38x15.50R18LT	12.00	457	953	959	390
38x15.50R20LT	12.00	508	953	959	390
39x13.50R17LT	11.00	432	978	985	345
40x13.50R17LT	11.00	432	1004	1010	345
40x13.50R20LT	11.00	508	1004	1010	345
40x14.50R17LT	12.00	432	1004	1010	372
40x14.50R18LT	12.00	457	1004	1010	372
40x14.50R20LT	12.00	508	1004	1010	372
40x15.50R20LT	12.00	508	1004	1010	390
40x15.50R22LT	12.00	559	1004	1010	390
40x15.50R24LT	12.00	610	1004	1010	390

Tyre-size designation[1,4]	*Measuring rim width code*	*Nominal rim diameter*	*Outer diameter D (mm)*[2]		*Section width S (mm)*[3]
		d (mm)	*Highway Tread*[6]	*Traction Tread*[5]	
40x15.50R26LT	12.50	660	1004	1010	395
42x14.50R17LT	12.00	432	1055	1061	372
42x14.50R20LT	12.00	508	1055	1061	372
8.00-16.5LT	6.00	419	720	730	203
8.75-16.5LT	6.75	419	748	759	222
9.50-16.5LT	6.75	419	776	787	241
10-16.5LT	8.25	419	762	773	264
12-16.5LT	9.75	419	818	831	307
30x9.50-16.5LT	7.50	419	750	761	240
31x10.50-16.5LT	8.25	419	775	787	266
33x12.50-16.5LT	9.75	419	826	838	315
35x12.50 R16.5LT	10.00	419	877	883	318
37x12.50-16.5LT	9.75	419	928	939	315
37x14.50-16.5LT	11.25	419	928	939	365

[1] Tyres in Radial construction are identified by the letter "R" in place of "-" (e.g. 24x7.50 R 13LT).

[2] Coefficient 'b' for the calculation of D_{max}: 1.07. The manufacturer shall declare in section 9 of the communication form in Annex 1 ('Any remarks') the type of tread selected for the application.

[3] Overall width may exceed this value up to +7 per cent.

[4] In case of Tyre size designations not included in this table (e.g. 37x14.50R17LT):

a) the first number (e.g. 37) represents the nominal overall diameter expressed by code;

b) the second number (e.g. 14.50) represents the nominal section width (S1) expressed by code (must end in .50);

c) the third number (e.g. 17) represents the nominal rim diameter (d) expressed by code.

To convert dimensions expressed in code to mm multiply by 25.4 and round to the nearest mm.

The theoretical rim width code (A_1) is taken to equal to the nominal section width (S_1) expressed by code multiplied by the factor 0.8 rounded to the nearest 0.5 step.

The Outer diameter (D) is calculated as follows:

a) Normal D (mm) = (overall diameter (expressed by code) – 0.48) x 25.4 rounded to the nearest mm.

b) Snow D (mm) = (overall diameter (expressed by code) – 0.24) x 25.4 rounded to the nearest mm."

[5] Traction tread tyres are those bearing at least one of the following inscriptions:

- Inscription(s) defined in section 3.1.13. of this Regulation.
- Alpine symbol (3PMSF) as defined in UN Regulation 117.
- "TRACTION" inscription as defined in UN Regulation 117.

[6] Highway tread tyres are all tyres that are not Traction tread.

Table C

Code designated tyres mounted on 5° tapered or flat base rims
Diagonal and radial

Tyre-size designation[1]	*Measuring rim width code*	*Nominal rim diameter d (mm)*	*Outer diameter D (mm)*[2]			*Section width S (mm)*[3]
			Normal		*Smax*	
			(a)	*(b)*		
6.50-20	5	508	878	-	893	184
7.00-15TR	5.5	381	777	-	792	199
7.00-18	5.5	457	853	-	868	199
7.00-20	5.5	508	904	-	919	199
7.50-15TR	6	381	808	-	825	215
7.50-17	6	432	859	-	876	215
7.50-18	6	457	884	-	901	215
7.50-20	6	508	935	-	952	215
8.25-15TR	6.5	381	847	855	865	236
8.25-20	6.5	508	974	982	992	236
9.00-15TR	7	381	891	904	911	259
9.00-20	7	508	1019	1031	1038	259
10.00-15TR	7.5	381	927	940	946	278
10.00-20	7.5	508	1054	1067	1073	278
10.00-22	7.5	559	1104	1118	1123	278
11.00-20	8	508	1085	1099	1104	293
11.00-22	8	559	1135	1150	1155	293
11.00-24	8	610	1186	1201	1206	293
11.50-20	8	508	1085	1099	1104	296
12.00-20	8.5	508	1125	-	1146	315
12.00-24	8.5	610	1226	-	1247	315
14.00-20	10	508	1241	-	1266	375
14.00-24	10	610	1343	-	1368	375
16.00-20	11.25	508	1309	1320	-	438

[1] Tyres in Radial construction are identified by the letter "R" in place of "-"(e.g. 6.50 R 20).

[2] Coefficient 'b' for the calculation of Dmax : 1.06. Category of use: Normal Service tyres: (a) Highway tread (b) Heavy tread

[3] Overall width may exceed this value up to +6 per cent.

Table D

Code designated tyres for special services
Diagonal and radial

Tyre-size designation	*Measuring rim width code*	*Nominal rim diameter d (mm)*	*Outer diameter D (mm)*[1]		*Section width S (mm)*[2]
			(a)	*(b)*	
10.00-20ML	7.5	508	1073	1099	278
11.00-22ML	8	559	1155	1182	293
13.00-24ML	9	610	1302	-	340
14.00-20ML	10	508	1266	-	375
14.00-24ML	10	610	1368	-	375
15-19.5ML	11.75	495	1019	-	389
24 R 21	18	533	1372	-	610

[1] Coefficient "b" for the calculation of Dmax : 1.06.
Category of use: special (a) Traction tread (b) Heavy tread

[2] Overall width may exceed this value up to +8 per cent.

Table E

Code designated tyres mounted on 15° tapered rims
Diagonal and radial

Tyre-size designation[1]	*Measuring rim width code*	*Nominal rim diameter d (mm)*	*Outer diameter D (mm)*[2]			*Section width S (mm)*[3]
			Normal			
			(a)	*(b)*	*Snow*	
8-19.5	6.00	495	859	-	876	203
8-22.5	6.00	572	935	-	952	203
9-22.5	6.75	572	974	982	992	229
10-22.5	7.50	572	1019	1031	1038	254
11-22.5	8.25	572	1054	1067	1073	279
11-24.5	8.25	622	1104	1118	1123	279
12-22.5	9.00	572	1085	1099	1104	300
12-24.5	9.00	622	1135	1150	1155	300
12.5-22.5	9.00	572	1085	1099	1104	302
12.5-24.5	9.00	622	1135	1150	1155	302
14-17.5	10.50	445	907	-	921	349 (-)
15-19.5	11.75	495	1005	-	1019	389 (-)
15-22.5	11.75	572	1082	-	1095	389 (-)
16.5-22.5	13.00	572	1128	-	1144	425 (-)
18-19.5	14.00	495	1080	-	1096	457 (-)
18-22.5	14.00	572	1158	-	1172	457 (-)
24R20.5	18.00	521	1369	-	-	606

[1] Tyres in Radial construction are identified by the letter "R" in place of "-" (e.g. 8R19.5).

[2] Coefficient "b" for the calculation of Dmax : 1.05.
Category of use: Normal Service tyres: (a) Highway tread (b) Heavy tread

[3] Overall width may exceed this value up to +6 per cent
(-) Overall width may exceed this value up to +5 per cent.

Annex 6

Method of dimension measurement for measuring tyres

1. The tyre is mounted on the measuring rim specified by the manufacturer pursuant to paragraph 4.1.11. of this Regulation and is inflated to the pressure specified by the manufacturer pursuant to paragraph 4.1.12. of this Regulation.

2. The tyre fitted on its rim is conditioned to the ambient temperature of the laboratory for at least 24 hours.

3. The pressure is readjusted to the value specified in paragraph 1. above.

4. The overall width is measured by caliper at six equally-spaced points, account being taken of the thickness of the protective ribs or bands. The highest measurement so obtained is taken as the overall width.

5. The outer diameter is calculated from the maximum circumference.

Annex 7

Procedure for load/speed endurance tests

1. Preparing the tyre

1.1. Mount a new tyre on the test rim specified by the manufacturer pursuant to paragraph 4.1.11. of this Regulation.

1.2. Use a new inner tube or combination of inner tube, valve and flap (as required) when testing tyres with inner tubes.

1.3. Inflate the tyre to the pressure corresponding to the pressure specified by the manufacturer pursuant to paragraph 4.1.12. of this regulation.

1.4. Condition the tyre-and-wheel assembly at test-room temperature for not less than three hours.

1.5. Readjust the tyre pressure to that specified in paragraph 1.3. above.

2. Test procedure

2.1. Mount the tyre-and-wheel assembly on the test axle and press it against the outer face of a smooth power-driven test drum 1.70 m ± 1 per cent in diameter having a surface at least as wide as the tyre tread.

2.2. Apply to the test axle a series of test loads expressed in per cent of the load indicated, in Annex 4 to this Regulation, opposite the load index engraved on the sidewall of the tyre, in accordance with the test programme below. Where the tyre has load-capacity indices for both single and twinned utilization, the reference load for single utilization shall be taken as the basis for the test loads.

2.2.1. In the case of tyres with a speed category symbol above P, test procedures are as specified in paragraph 3.

2.2.2. For all other tyre types, the endurance test programme is shown in Appendix 1 to this annex.

2.3. The tyre pressure must not be corrected throughout the test and the test load must be kept constant throughout each of the three test stages.

2.4. During the test the temperature in the test-room must be maintained at a temperature between 20 °C and 30 °C or at a higher temperature if the manufacturer so agrees.

2.5. The endurance-test programme shall be carried out without interruption.

3. Load/speed test programme for tyre with speed category symbol Q and above

3.1. This programme applies to:

3.1.1. All tyres marked with load capacity index in single 121 or less.

3.1.2. Tyres marked with load capacity index in single 122 and above and with the additional marking "C", or "LT", referred to in paragraph 3.1.14. of this Regulation.

3.2. Load placed on the wheel as a percentage of the load corresponding to the load index:

3.2.1. 90 per cent when tested on a test drum 1.70 m ± 1 per cent in diameter;

3.2.2. 92 per cent when tested on a test drum 2.0 m ± 1 per cent in diameter.

3.3. Initial test speed: speed corresponding to the speed category symbol less 20 km/h;

3.3.1. Time to reach the initial test speed 10 min.

3.3.2. Duration of the first step = 10 min.

3.4. Second test speed: speed corresponding to the speed category symbol less 10 km/h;

3.4.1. Duration of the second step = 10 min.

3.5. Final test speed: speed corresponding to the speed category symbol:

3.5.1. Duration of the final step = 30 min.

3.6. Total test duration: 1 h.

4. Equivalent test methods

If a method other than that described in paragraph 2. above is used, its equivalence must be demonstrated.

Annex 7 - Appendix 1

Endurance-test programme

Load index	*Tyre speed category symbol*	*Test-drum speed*		*Load placed on the wheel as a percentage of the load corresponding to the load index*		
		Radial-ply km.h⁻¹	*Diagonal (bias-ply) km.h⁻¹*	*7 h*	*16 h*	*24 h*
122 or more	F	32	32			
	G	40	32			
	J	48	40			
	K	56	48			
	L	64	-			
	M	72	-	66 %	84 %	101 %
121 or less	F	32	32			
	G	40	40			
	J	48	48			
	K	56	56			
	L	64	56	70 % 4 h	88 % 6 h	106 %
	M	80	64	75 %	97 %	114 %
	N	88	-	75 %	97 %	114 %
	P	96	-	75 %	97 %	114 %

Notes:

(1) "Special-use" tyres (see paragraph 2.1. (c) of this Regulation) should be tested at a speed equal to 85 per cent of the speed prescribed for equivalent normal tyres.

(2) Tyres with load index 122 or more, speed category symbols N or P and the additional marking "LT", or "C", referred to in paragraph 3.1.14. of this regulation, shall be tested with the same programme as specified in the above table for tyres with load index 121 or less.

Annex 7 - Appendix 2

Relation between the pressure index and the units of pressure

Pressure Index ("PSI")	*Bar*	*kPa*
20	1.4	140
25	1.7	170
30	2.1	210
35	2.4	240
40	2.8	280
45	3.1	310
50	3.4	340
55	3.8	380
60	4.1	410
65	4.5	450
70	4.8	480
75	5.2	520
80	5.5	550
85	5.9	590
90	6.2	620
95	6.6	660
100	6.9	690
105	7.2	720
110	7.6	760
115	7.9	790
120	8.3	830
125	8.6	860
130	9.0	900
135	9.3	930
140	9.7	970
145	10.0	1 000
150	10.3	1 030
...	...	...

Annex 8

Variation of load capacity with speed commercial vehicles tyres - Radial and diagonal

(See paras. 2.30. and 2.32.)

Variation of load capacity (per cent)										
Speed (km/h)	*All load indices*				*Load indices ≥ 122[1]*		*Load indices ≤ 121*			
	Speed category symbol				*Speed category symbol*		*Speed category symbol*			
	F	G	J	K	L	M	L	M	N	P[2]
0	+150	+150	+150	+150	+150	+150	+110	+110	+110	+110
5	+110	+110	+110	+110	+110	+110	+90	+90	+90	+90
10	+80	+80	+80	+80	+80	+80	+75	+75	+75	+75
15	+65	+65	+65	+65	+65	+65	+60	+60	+60	+60
20	+50	+50	+50	+50	+50	+50	+50	+50	+50	+50
25	+35	+35	+35	+35	+35	+35	+42	+42	+42	+42
30	+25	+25	+25	+25	+25	+25	+35	+35	+35	+35
35	+19	+19	+19	+19	+19	+19	+29	+29	+29	+29
40	+15	+15	+15	+15	+15	+15	+25	+25	+25	+25
45	+13	+13	+13	+13	+13	+13	+22	+22	+22	+22
50	+12	+12	+12	+12	+12	+12	+20	+20	+20	+20
55	+11	+11	+11	+11	+11	+11	+17.5	+17.5	+17.5	+17.5
60	+10	+10	+10	+10	+10	+10	+15.0	+15.0	+15.0	+15.0
65	+7.5	+8.5	+8.5	+8.5	+8.5	+8.5	+13.5	+13.5	+13.5	+13.5
70	+5.0	+7.0	+7.0	+7.0	+7.0	+7.0	+12.5	+12.5	+12.5	+12.5
75	+2.5	+5.5	+5.5	+5.5	+5.5	+5.5	+11.0	+11.0	+11.0	+11.0
80	0	+4.0	+4.0	+4.0	+4.0	+4.0	+10.0	+10.0	+10.0	+10.0
85	-3	+2.0	+3.0	+3.0	+3.0	+3.0	+8.5	+8.5	+8.5	+8.5
90	-6	0	+2.0	+2.0	+2.0	+2.0	+7.5	+7.5	+7.5	+7.5
95	-10	-2.5	+1.0	+1.0	+1.0	+1.0	+6.5	+6.5	+6.5	+6.5
100	-15	-5	0	0	0	0	+5.0	+5.0	+5.0	+5.0
105	-	-8	-2	0	0	0	+3.75	+3.75	+3.75	+3.75
110	-	-13	-4	0	0	0	+2.5	+2.5	+2.5	+2.5
115	-	-	-7	-3	0	0	+1.25	+1.25	+1.25	+1.25
120	-	-	-12	-7	0	0	0	0	0	0
125	-	-	-	-	-	0	-2.5	0	0	0
130	-	-	-	-	-	0	-5.0	0	0	0
135	-	-	-	-	-	-	-7.5	-2.5	0	0

Variation of load capacity (per cent)										
Speed (km/h)	*All load indices*				*Load indices ≥ 122*[2]		*Load indices ≤ 121*[1]			
	Speed category symbol				*Speed category symbol*		*Speed category symbol*			
140	-	-	-	-	-	-	-10	-5	0	0
145	-	-	-	-	-	-	-	-7.5	-2.5	0
150	-	-	-	-	-	-	-	-10.0	-5.0	0
155	-	-	-	-	-	-	-	-	-7.5	-2.5
160	-	-	-	-	-	-	-	-	-10.0	-5.0

[1] The load capacity indices refer to a single operation.

[2] Load variations are not allowed for speeds above 160 km/h. For speed category symbols "Q" and above the speed category corresponding to the speed category symbol (see paragraph 2.31.2.) specifies the maximum speed permitted for the tyre.

Annex 9

Communication

Upgrade of service description for the purposes of retreading in accordance with Regulation No. 109

(Maximum format: A4 [210 x 297mm])

Issued by (Name and address of tyre manufacturer): .....

.....

Declaration:

The tyre corresponding to the following details has been approved to operate at a higher service description than that of the tyre originally approved. It is therefore permitted, subject to any limitations given in paragraph 4.1.1. below, for a tyre bearing the original service description and approval number, to be retreaded to the upgraded service description.

It is also agreed that this information may be released by an approval authority to any retreading production unit that is approved in accordance with Regulation No. 109.

1. Manufacturer's name: .....

2. Manufacturer's tyre type designation: .....

2.1. Brand name(s) trademark(s): .....

2.2. Trade description(s)/ Commercial name(s)/.....

3. Tyre Size designation: .....

.....

3.1. Category of use (Normal, Snow or Special): .....

.....

4. Service description

4.1. Original tyre:.....

Approval No. pursuant to Regulation No. 54. .....

.....

Granted by: .....

.....

4.1.1. Where applicable, the production plant in which tyres suitable for upgrading were produced, the production periods concerned, and the means of identifying either or both of these issues: .....

.....

.....

4.2. Upgraded tyre: .....

Approval No. pursuant to Regulation No. 54. .....

Granted by: .....

5. Authorized by (tyre manufacturer's representative):

5.1. Name (Block capitals): .....

5.2. Department: .....

5.3. Signature: .....